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EPAct and Related Testing Status and Rulemaking Usage

May 27, 2008

Background. Program, Reason, Usage

- Light Duty Exhaust Fuels (~\$4.3M EPA, \$3M DOE)
 - Reason: Impact of ETOH and fuel properties on Tier 2 exhaust emissions
 - Usage: MOVES and Complex model, EISA, CMAQ, SPECIATE, PM source app.
 - RFS2 NPRM (freeze data July, 2008) - E10, E15 discussion
 - RFS2 FRM, (1st Q 2009) Extensive E10, E15, E20 data set from Phases 1&2 (partial 3)
- Oil PM Study
 - Reason: Determine oil age and ETOH interaction impact on PM
 - Usage: Support of LDEF and future MOVES PM oil age relationship
 - LDEF vehicle mileage requirements for oil stability
 - Oil change requirements between ETOH blends
- PM Speciation
 - Reason: Impact of ETOH on Tier 2 vehicle PM and VOC speciation profiles, metals
 - Usage: CMAQ and other modeling, source apportionment work
 - RFS2 FRM
- Non-Road Exhaust
 - Reason: Impact of ETOH on sample of non-road engine exhaust
 - Usage: MOVES (general data need) to support:
 - Early data for RFS2 NPRM, RFS2 FRM
- Evaporative Testing
 - Reason: Impact of ETOH on Tier 2 near zero and determine % fleet malfunctioning
 - Usage: MOVES (general data need) and to support:
 - RFS2 FRM
- All data can be used for future GHG rulemaking, EISA Anti-Backsliding report to Congress, & update of Complex Model (2009)

Light Duty Exhaust Fuels (SWRI)

- Phase 1 - Started (75F with E0, E10, E15) – (4/08 to 6/08)
 - All 19 vehicles aged to 4k on dyno and oil samples taken for analysis
 - E0 fuel testing underway
 - Program issues resulting in delays:
 - Proper blending of fuels (3 of 31 total) has been difficult
 - Fuel supplier trouble blending E10 and E15 at desired distillation distribution (T#s)
 - EPA to specify via refinery industry blending tool
 - Refinery tool requires EPA staff to specify blendstocks portions
 - Due to CBI nature, EPA will handle refinery tool and supplier blendstock data for program
 - Toxics analysis found DNPH contamination – solved but some lost data
 - Tunnel issue finding PM with blanks – solved with cleaning/EPA inspection
 - Flow meter issue – using SAO for second by second data until solved
 - OBD data issue – solved with vehicle communication interface upgrade
- Phase 2 – (50F with E0, E10, E15) – (7/08 to 9/08)
 - Required facility upgrades which are in process
 - Temperature & humidity control units
- Phase 3 - Planned (9/08 to 5/09)
 - Fuel blendstock recipe to be supplied by EPA via Refinery tool
 - Addressing DOE requests (Doug Lawson)
 - Attempting to meet high emitter desires while meeting overall EPA/DOE needs
 - Convinced DOE to run high emitter/high mileage vehicles at end of phase 3

Fresh Oil PM Study (NVFEL)

- Oil PM stabilization on E0 completed
 - EPAAct Phase 1 oil aging(2k) “safe” from fresh oil influences on PM
 - Conclusion: Stabilization occurs much lower mileage (.5k to 1k)
 - Likely oil time at temp relationship
 - Did not isolate to PCV (off-gassing) or cylinder surface (oil shearing)
- Oil PM and ethanol fuels (E10 & E20) completed
 - Oil samples will be analyzed for ethanol content– likely little found
 - Decision will need to be made:
 - IF no PM change E0 to E10 to E20 – no oil changes required for EPAAct
 - ELSE (isolate to fuel only or fuel/oil interaction)
 - Go back to E0 to see if reversible then move to E20
 - » If Fuel caused any PM change and not oil related – good news
- Outcome of E0/E10/E20 influence on PM findings:
 - If PM rates are a function of ethanol content (up or down)
 - Dictates if fuels can be randomized in EPAAct Phase 3
 - Driver influence on PM
 - Preferred statistical approach
 - Use as comparison to DOE PM findings (Doug Lawson)

PM Speciation

(NVFEL/ORD-NRMRL)

- ORD (\$700K)
 - NRMRL supplied a proposal that fulfills our data needs including:
 - Low-temperature work
 - NRMRL has EPA funding for this project that we can leverage
 - Positive results from new research to provide phase-specific SVOC speciation instead of combining sample across phases
 - Vehicle testing: ASD site visit(s) and/or participation to address any potential issues/concerns
 - Analytical capability, especially for SVOCs is state-of-the art
 - Toxics sampling equipment will be supplied for program
- NVFEL (\$400K)
 - LOD analytical capabilities and capacity will be determined for subset
 - Vehicle testing: On-site expertise and state-of-the art sample collection capacity
 - On-site analytical capability for chemical speciation of PM is currently limited
 - Discussion regarding desired E85 testing
 - Cross lab checks planned and explore NVFEL future programs
- Additional funding to expand testing

Nonroad Exhaust (Intertek Carnot - \$800K)

- EPA Act E10 fuel (#18) delayed
 - Common with vehicle program
 - Program waiting for fuel before proceeding (baseline emissions needed on #18)
- All engines (12) acquired
 - (4) class I, (4) class II, (4) class IV
- Correlation engine (Environment Canada program)
 - Differences in criteria emissions and PM found
 - Investigating
 - Measurement/sampling method differences
 - Investigating PM filter differences
 - Possibly proceed even with correlation emission differences
 - Lab to Lab normal differences
 - Engine BSFC are much closer indicating load correlation
 - Engines still comply with standards
- Additional nonroad testing program discussions (available funds)
 - Leverage ARB E6, E10 program
 - DOE interested in participating for they now have available funds
 - Target largest emission inventory and more relative to all US
 - Warm weather equipment (motorcycles, boats, ATVs)
 - Cold weather equipment (snowmobiles, snow removal equipment, etc)

Non-Road Exhaust (SwRi - \$500K)

- Coordination with ARB & DoE

Evaporative Testing

- \$1.6 Million + CRC funds
- Program Design for E-77-2 (Current program at ATL)
 - Test Plan, after 4 weeks preconditioning at each ethanol level:
 - Static permeation
 - Running loss
 - Hot soak
 - 72 hour diurnal (65°-105°F)
 - Time Line: Testing to be complete September of 2008
- Program Design for E77-2b (New program at SwRI)
 - *Objective:* Additional, newer technology, high sales volume vehicles to the CRC E-77-2
 - Designated E-77-2b by CRC, EPA is the Lead
 - EPA evaporative emissions experts input to program
 - Plan to repeat E-77-2 program with 8 more vehicles and 1 implanted leak, without E20 fuel (unless added by DOE)
 - Speciation on 100+ VOCs
 - Testing at SwRI, will take ~12 mos. (complete summer of 2009)
 - CRC has offered to supply fuel which was left over from E-74b and E-77-2 programs for continuity
 - CRC has offered to supply 5 vehicles from E-74b program for EPA related work; all aging enhanced evap will work well here, not appropriate for the LD Gas Fuels program where required newer vehicles. (Pending CRC Board approval)

E77-2b
Vehicles:
8 total
1 implanted leak

Fuels:
E0, 7 and 9 psi
E10, 7 and 10 psi
E20, 9 psi funded by DOE

Determine Fraction of High Evap Vehicles in Fleet (ERG – CO/TX)

- *Objective*: Find the percentage of high emitting evaporative emission vehicles in the average fleet of on-road motor vehicle passenger cars and light trucks.
- Pilot Program: propose and refine test procedure
 - 100 vehicles
 - Pre-screen using RSD
 - Evaluate several methods including portable SHED
- Main Program
 - Do measurements on ~1000 vehicles
 - Apply protocols developed in pilot
- ICR
 - Specific to this project
 - Pilot must take place this summer
 - **At OMB for review**
- Collaboration
 - Colorado Department of Public Health and Environment (CDPHE)
 - Offering RSD and technical expertise
 - CRADA in process (Colorado has signed, OGC is reviewing)
 - CRC

EPAct Testing Budget (millions)

Testing	2007	2008	Notes	DoE	CRC
Fuel Effects Testing	\$3.3 (+0.15)		Pulled ahead funds	\$2.0	Need \$0.06 horset rade
PM Speciation NRML		\$0.4 n/a	Data analysis/ testing/ AVL sampler. (ORD + \$0.7)		
Evap E772b SwRI		\$0.6	Evap Testing	\$0.10	Fuels + 5 vehicles
Evap E773 ERG	\$1.0		Evap leaker rate, pulled ahead funds		\$0.04
CRC E74 b			CO/RVP Effects (E0,		\$0.25